

series	I	II	III	IV
growth temperature	760°C	760°C	760°C	760°C
PH <sub>3</sub> pressure	800 pa	800 pa	800 pa	800 pa
indium composition (nominal/measured)	0.27/ 0.26	0.32/ 0.31	0.10/ 0.10	0.10/ 0.10
grading rate	variable	constant	constant	constant

FIG. 1

Temperature	760°C	760°C
x	0.26	0.31
R <sub>g</sub> - (10μm) <sup>2</sup> scan area	25 nm ± 6 nm	45 nm ± 25 nm
A <sub>0041</sub>	170' ± 8'	303' ± 10'
A <sub>field</sub> - PVTEM	6.3×10 <sup>6</sup> cm <sup>-2</sup> ± 2.4×10 <sup>6</sup> cm <sup>-2</sup>	1.1×10 <sup>6</sup> cm <sup>-2</sup> ± 0.2×10 <sup>6</sup> cm <sup>-2</sup>
A <sub>bulkup</sub> - CL	377 cm <sup>-1</sup>	1128 cm <sup>-1</sup>
A <sub>linear</sub> - PVTEM	2.7×10 <sup>4</sup> cm <sup>-1</sup>	1.2×10 <sup>5</sup> cm <sup>-1</sup>
A <sub>overall</sub> - PVTEM + CL	1.6×10 <sup>7</sup> cm <sup>-2</sup>	2.5×10 <sup>8</sup> cm <sup>-2</sup>
A <sub>branch</sub> (transverse) - PVTEM	6000 cm <sup>-1</sup> ± 196 cm <sup>-1</sup>	4773 cm <sup>-1</sup> ± 693 cm <sup>-1</sup>
A <sub>branch</sub> (axial) - PVTEM	939 cm <sup>-1</sup> ± 61 cm <sup>-1</sup>	832 cm <sup>-1</sup> ± 110 cm <sup>-1</sup>

FIG. 3

FIG. 2

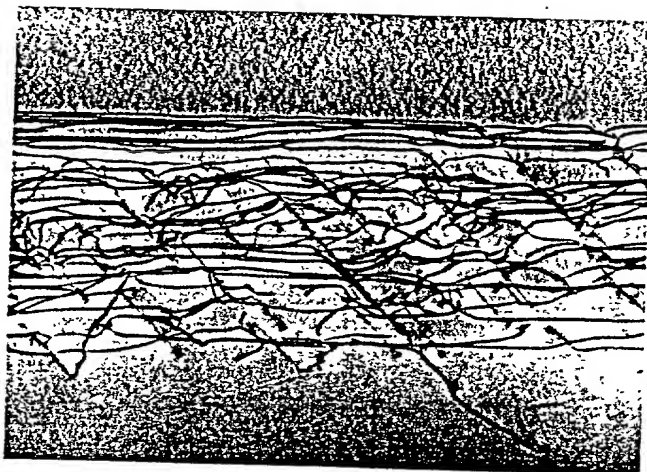


FIG. 4A



FIG. 4B



FIG. 5

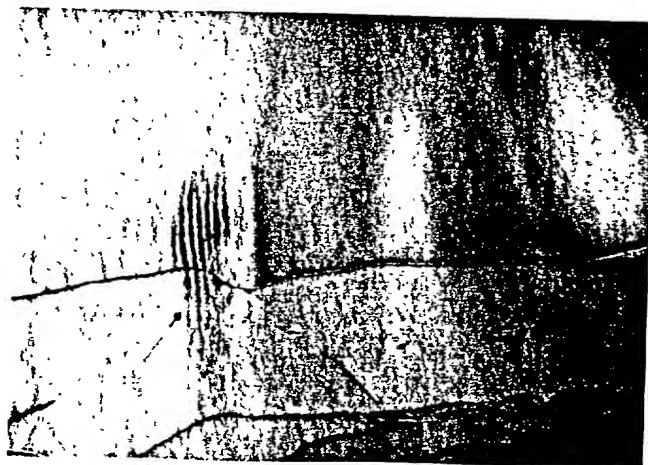


FIG. 6A



FIG. 6B



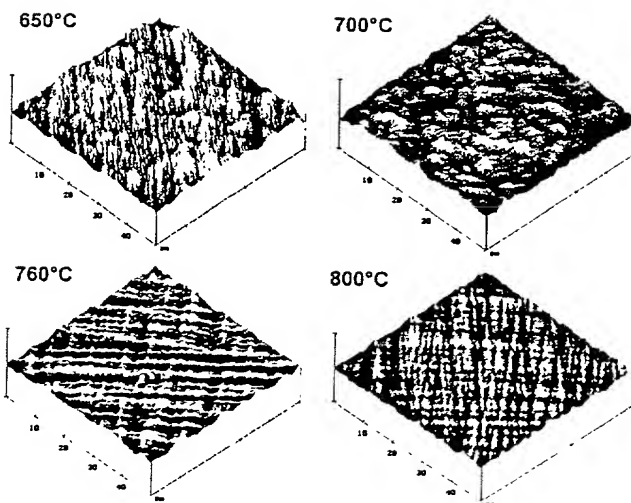
FIG. 8A



FIG. 8B



FIG. 10



Temperature	700°C	760°C	810°C
x	0.34	0.31	0.36
$R_g - (10\mu\text{m})^2$	13 nm $\pm$ 2 nm	68 nm $\pm$ 25 nm	118 nm $\pm$ 20 nm
$\beta_{004}$	275' $\pm$ 10'	420' $\pm$ 30'	—
$\rho_{\text{field}} - \text{CL}$	$4.9 \times 10^6 \text{ cm}^{-2}$ $\pm 0.9 \times 10^6 \text{ cm}^{-2}$	—	—
$\rho_{\text{field}} - \text{PVTEM}$	$4.4 \times 10^6 \text{ cm}^{-2}$ $\pm 1.0 \times 10^6 \text{ cm}^{-2}$	—	—
$\rho_{\text{lineup}} - \text{CL}$	92 $\text{cm}^{-1} \pm 23 \text{ cm}^{-1}$	>2000 $\text{cm}^{-1}$	—
$\rho_{\text{lineup}} - \text{CL} + \text{PVTEM}$	$2.1 \times 10^5 \text{ cm}^{-1}$	—	—
$\rho_{\text{overall}} - \text{CL} + \text{PVTEM}$	$6.8 \times 10^6 \text{ cm}^{-2}$ $\pm 2.0 \times 10^6 \text{ cm}^{-2}$	$1.5 \times 10^9 \text{ cm}^{-2}$ $\pm 0.3 \times 10^9 \text{ cm}^{-2}$	—
$\rho_{\text{branch}} (\text{transverse})$	7970 $\text{cm}^{-1}$ $\pm 327 \text{ cm}^{-1}$	5433 $\text{cm}^{-1}$ $\pm 529 \text{ cm}^{-1}$	—

FIG. 7

Temperature	650°C	700°C	760°C	800°C
x	0.15	0.09	0.11	0.12
$R_g - (10\mu\text{m})^2$ scan	8.5 nm $\pm$ 1.5 nm	7.7 nm $\pm$ 1 nm	6.0 nm $\pm$ 0.5 nm	4.9 nm $\pm$ 0.5 nm
$R_g - (50\mu\text{m})^2$ scan	12.2 nm $\pm$ 1.5 nm	10.5 nm $\pm$ 1 nm	7.4 nm $\pm$ 0.5 nm	6.0 nm $\pm$ 0.5 nm
$\beta_{004}$	93' $\pm$ 5'	58' $\pm$ 3'	54' $\pm$ 3'	53' $\pm$ 3'
$\rho_{\text{field}} - \text{PVTEM}$	$1.2 \times 10^7 \text{ cm}^{-2}$ $\pm 0.3 \times 10^7 \text{ cm}^{-2}$	$3.9 \times 10^6 \text{ cm}^{-2}$ $\pm 1.4 \times 10^6 \text{ cm}^{-2}$	$1.1 \times 10^6 \text{ cm}^{-2}$ $\pm 0.6 \times 10^6 \text{ cm}^{-2}$	$4.0 \times 10^5 \text{ cm}^{-2}$ $\pm 1.9 \times 10^5 \text{ cm}^{-2}$
$\rho_{\text{branch}} (\text{transverse}) - \text{PVTEM}$	26911 $\text{cm}^{-1}$ $\pm 2265 \text{ cm}^{-1}$	9808 $\text{cm}^{-1}$ $\pm 654 \text{ cm}^{-1}$	—	—
$\rho_{\text{branch}} (\text{transverse}) - \text{AFM}$	24114 $\text{cm}^{-1}$ $\pm 7312 \text{ cm}^{-1}$	—	—	—
Crosshatch Wavelength <011>-A	—	—	3.4 $\mu\text{m} \pm 0.9 \mu\text{m}$ , 8.7 $\mu\text{m} \pm 0.5 \mu\text{m}$	3.0 $\mu\text{m} \pm 0.3 \mu\text{m}$ , 7.0 $\mu\text{m} \pm 1.1 \mu\text{m}$
Crosshatch Amplitude <011>-A	—	—	9.9 nm $\pm$ 1.5 nm, 14.7 nm $\pm$ 2.4 nm	7.9 nm $\pm$ 1.2 nm, 11.7 nm $\pm$ 1.3 nm
Crosshatch Wavelength <011>-B	—	—	4.6 $\mu\text{m} \pm 0.7 \mu\text{m}$ , 8.5 $\mu\text{m} \pm 1.3 \mu\text{m}$	3.0 $\mu\text{m} \pm 0.4 \mu\text{m}$ , 6.3 $\mu\text{m} \pm 1.5 \mu\text{m}$
Crosshatch Amplitude <011>-B	—	—	10.5 nm $\pm$ 2.9 nm, 17.4 nm $\pm$ 2.7 nm	8.6 nm $\pm$ 1.2 nm, 12.4 nm $\pm$ 1.7 nm

FIG. 9

Temperature	760°C/700°C/ 650°C
x	0.389
$R_g - (10\mu\text{m})^2$ scan	13 nm $\pm$ 4 nm
$\beta_{004}$	277' $\pm$ 10'
$\rho_{\text{field}} - \text{CL}$	$4.1 \times 10^6 \text{ cm}^{-2}$ $\pm 0.5 \times 10^6 \text{ cm}^{-2}$
$\rho_{\text{field}} - \text{PVTEM}$	$3.7 \times 10^6 \text{ cm}^{-2}$ $\pm 0.8 \times 10^6 \text{ cm}^{-2}$
$\rho_{\text{lineup}} - \text{CL}$	71 $\text{cm}^{-1} \pm 18 \text{ cm}^{-1}$
$\rho_{\text{lineup}} - \text{CL} + \text{PVTEM}$	$8.5 \times 10^5 \text{ cm}^{-1}$
$\rho_{\text{overall}} - \text{CL} + \text{PVTEM}$	$4.7 \times 10^6 \text{ cm}^{-2}$ $\pm 1.1 \times 10^6 \text{ cm}^{-2}$
$\rho_{\text{branch}} (\text{transverse}) - \text{PVTEM}$	24636 $\text{cm}^{-1}$ $\pm 821 \text{ cm}^{-1}$
$\rho_{\text{branch}} (\text{transverse}) - \text{AFM}$	24000 $\text{cm}^{-1}$ $\pm \text{XXX cm}^{-1}$

FIG. 12

FOOTPRINT #40E200T

FIG. 11A



FIG. 11E

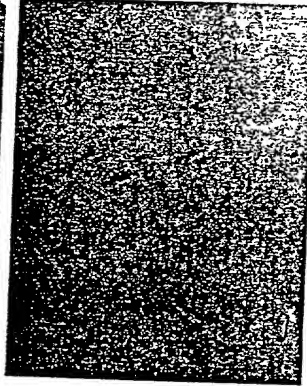


FIG. 13A



FIG. 13B

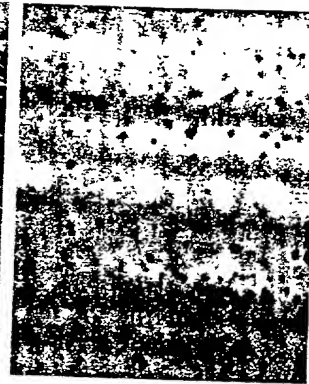


FIG. 14

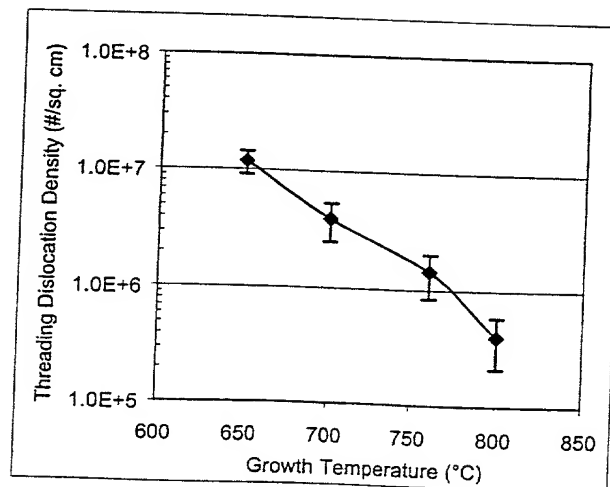


FIG. 15

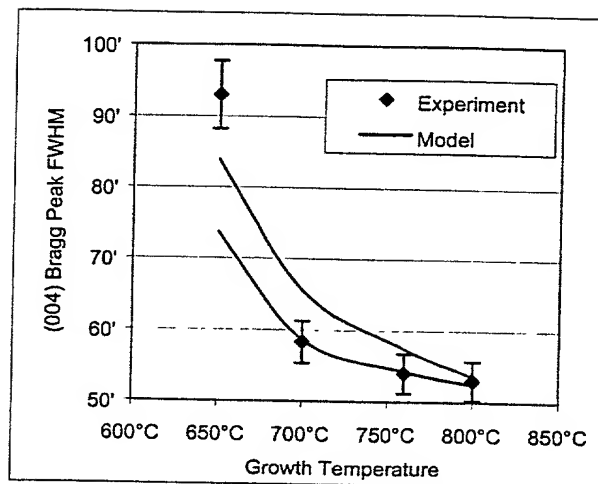


FIG. 16

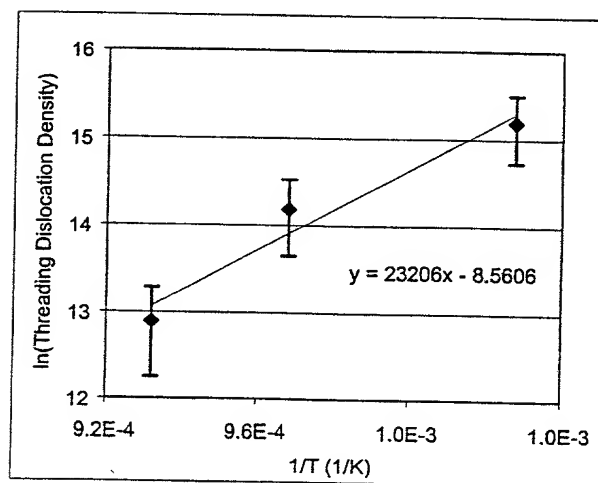


FIG. 17

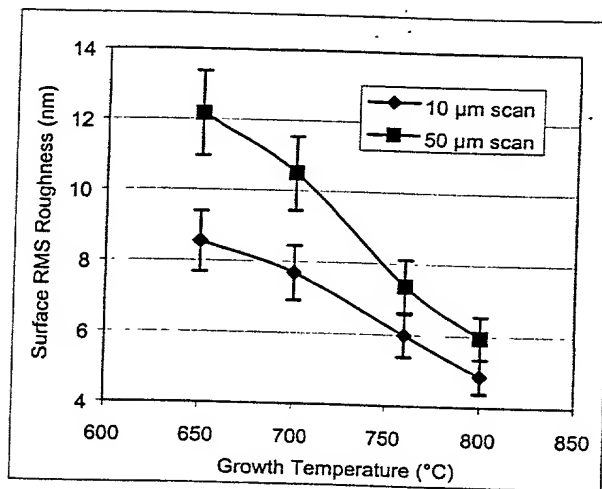


FIG. 18

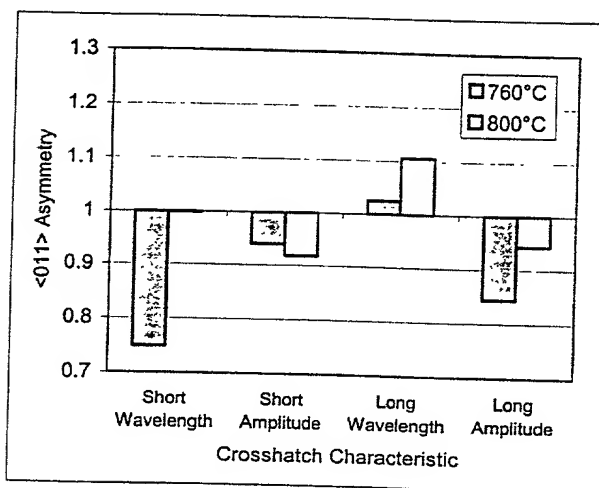


FIG. 19

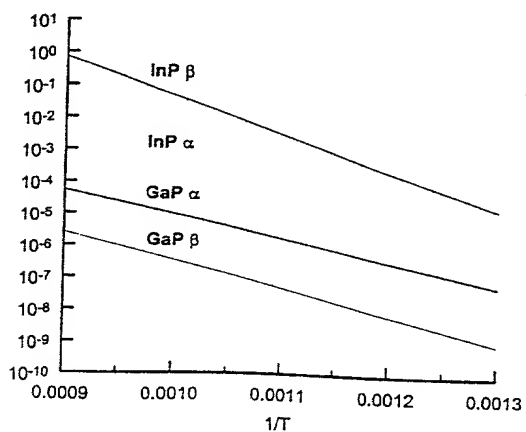


FIG. 20

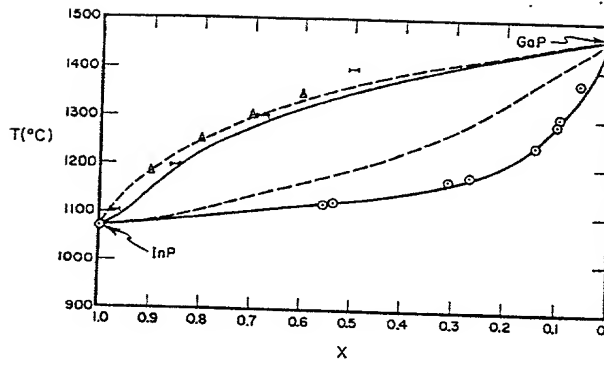


FIG. 21

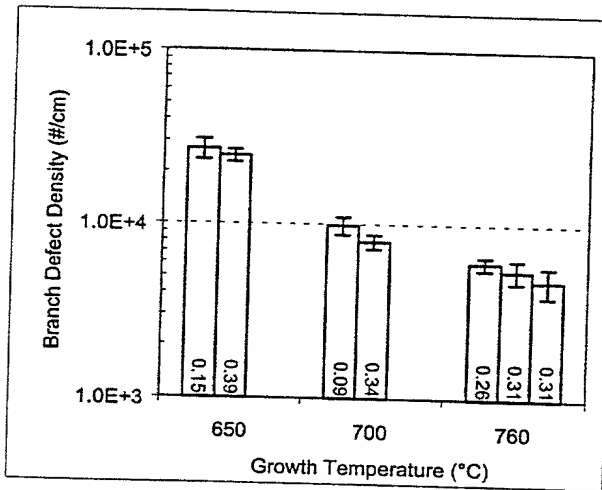
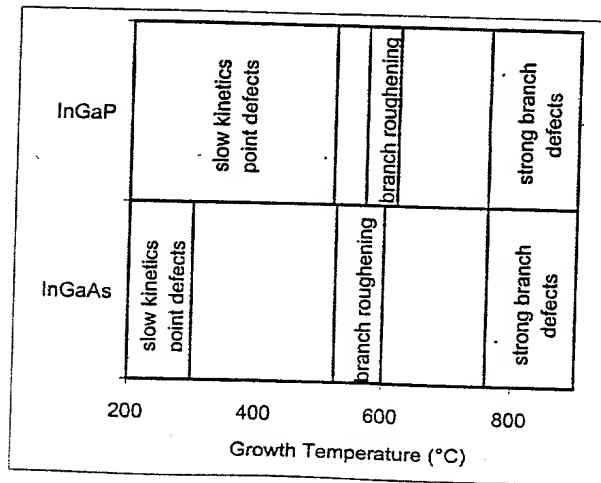


FIG. 22





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FIG. 23

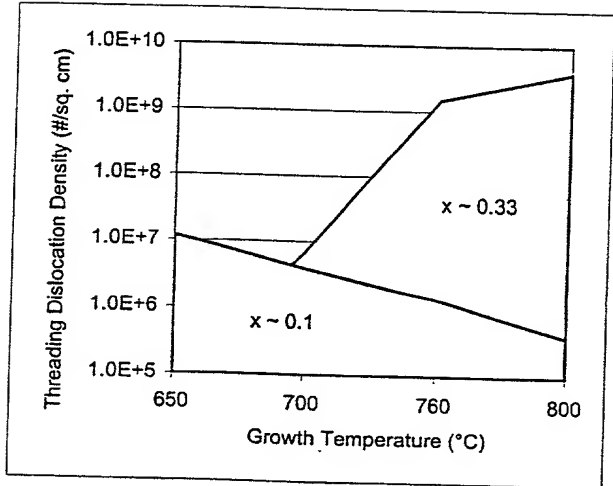


FIG. 24

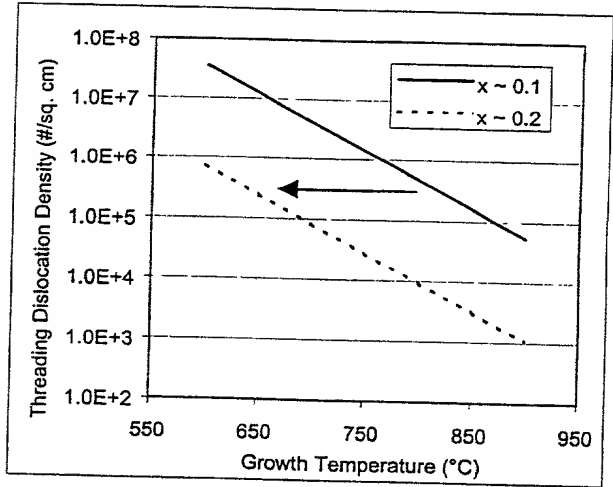


FIG. 25

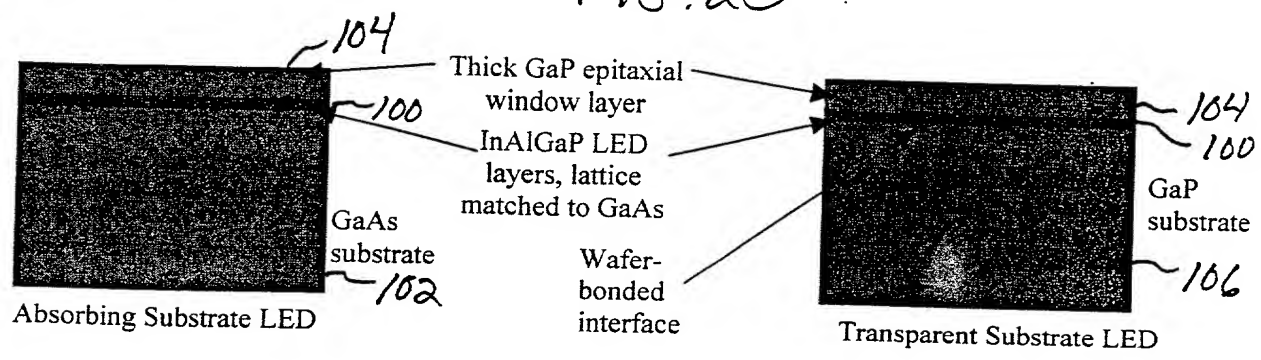


FIG. 26

